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ARCS

Remedial Planning Activities at Selected
Uncontrolled Hazardous Substance Disposal
Sites in the Zone of Regions IX and X

2363-00054

SDMS DOC ID 88152227

NEWMARK Groundwater Contamination Superfund Site

NEWMARK Operable Unit RI/FS Report

Volume 2: Appendices A - I

Contract No. 68-W9-0054/WA No. 54-10-9LJ5

URS
Consultants, Inc.

Team Subcontractors:

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Appendix A

Investigation Procedures

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1.0 INVESTIGATION PROCEDURES

In accordance with the URS Sample Plan dated 02/19/92 and the revised Sample Plan dated 06/02/92, fourteen (14) source area groundwater monitoring wells, at seven locations (Figure 1), and one plume area well were installed (Figure 2). Undisturbed core samples were collected during well drilling from selected locations and submitted to a laboratory for chemical analysis. Each source area well location consisted of a nested pair of groundwater monitoring wells designated A and B in a single well boring. Each well casing penetrated the aquifer to a different depth to aid in delineating the vertical distribution of contaminants within the aquifer. The plume area well was screened at ten discrete intervals and a Waterloo® multiple sampling system was installed in the well. Water samples were collected from the fourteen source area wells and the 10 sample intervals in the plume area well. In addition to the wells installed for this investigation, 25 existing municipal and monitoring wells were sampled.

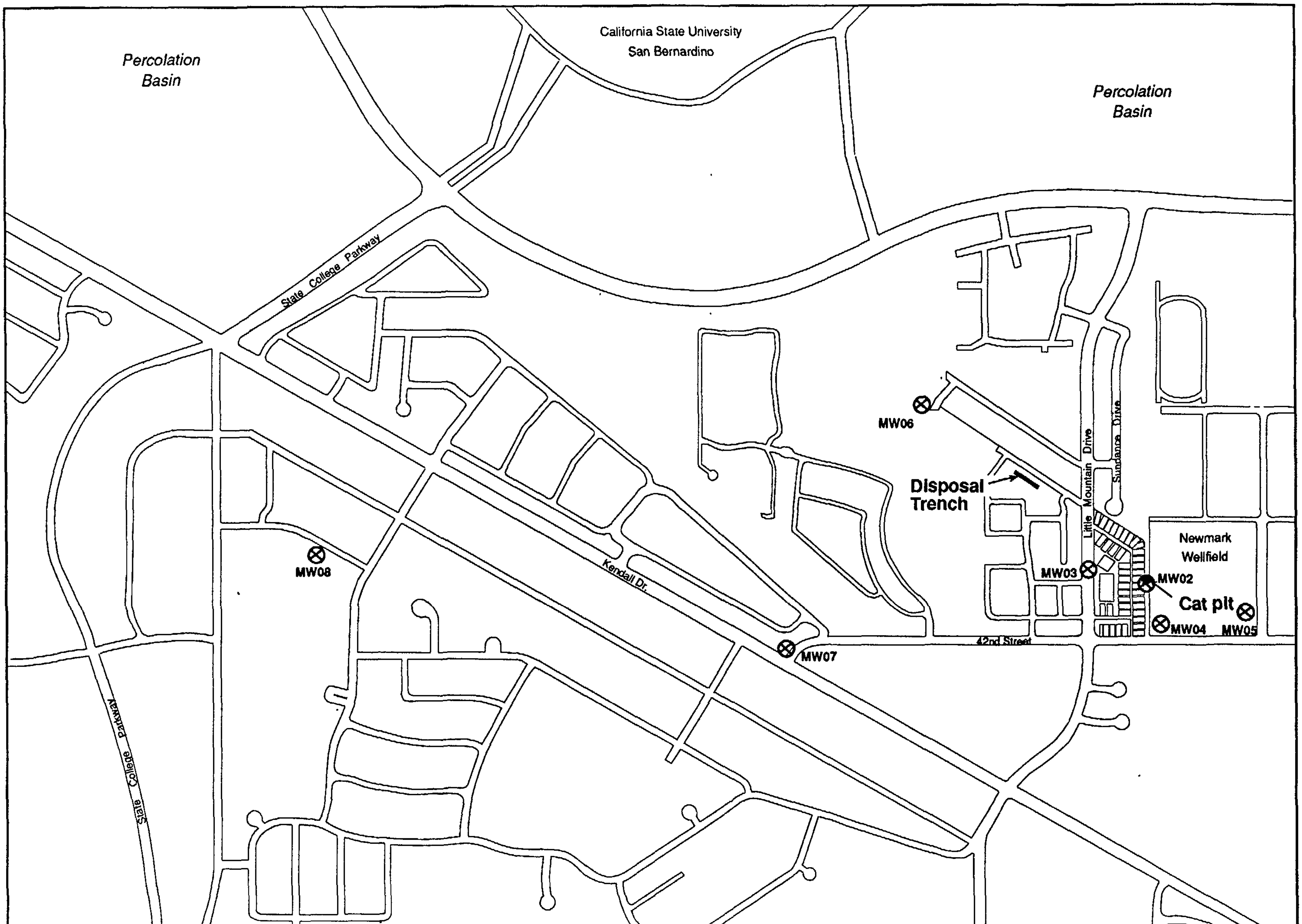
This section summarizes well installation and sampling used to acquire geologic, hydrogeologic, and groundwater contamination data.

1.1 DRILLING PROCEDURE

1.1.1 Source Area Wells

Overview

Fourteen (14) source area groundwater monitoring wells were installed at seven locations. Monitoring well borings were drilled using a combination of solid stem auger and mud rotary drilling techniques. Prior to moving the mud rotary drilling rig onto the drilling location, a 24-inch boring was drilled 20 to 40 feet for well locations MW02 through MW08, to allow installation of a surface conductor. This was accomplished using a Spira Drill model #3330 equipped with a 24-inch solid stem auger. Grab samples were collected about every 10 feet for lithologic examination. No samples were collected for chemical analysis during augering.



Not to Scale

Appendix A Figure 1
Newmark RI/FS Groundwater Contamination Project
Newmark Operable Unit RI/FS Report

URS #159 8/97

Appendix A Figure 2

Location of Plume Monitoring Well MW01

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0 1 2

Scale in Miles

Base Map from Automobile Club of Southern California, 1990.

LEGEND

⊗ = Monitoring Well Location

Well Drilling Procedure

Upon completion of the surface conductor boring, 20 to 40 feet of 14-inch (outside) diameter ASTM Type 53 ERW B NPS conductor casing, equipped with a guide shoe, was centered in the boring and lowered to the bottom. To secure the conductor casing in place, approximately 3 to 5 cubic yards of concrete was tremied into the annulus between the conductor casing and boring wall. The concrete was provided by a local ready mix firm and consisted of a 10-sack concrete mix with a slump of 4.00 seconds. Concrete was tremied from total depth to approximately 3 feet below the existing ground surface and allowed to set a minimum of 24 hours prior to drilling with the mud rotary rig.

Once the conductor casing was set for each boring, the auger rig was removed and a mud rotary rig was set up. For well locations MW02 through MW06, an Ingersol-Rand TH-100 mud rotary drilling rig was used to drill and complete the wells. Well locations MW07 and MW08 were installed using a Porta Drill TKT mud rotary drilling rig. Upon completion of rig-up, a direct mud rotary drilling technique was used to drill the monitoring well borings to their total depth. All wells were drilled using a 12¼-inch button or chisel tooth, tri-cone drill bit.

To remove drill cuttings from the wells and prevent excess side wall sloughing, each boring was filled with drilling fluid. The drilling fluid used was a mixture of potable water and bentonite (to provide weight and viscosity). Drilling fluid was originally mixed in a portable tank system (mud pits) equipped with dual mixing tanks, and centrifuge pump system. The borings were filled with drilling fluid by pumping the mud down through the drill pipe, out through the drill bit, and back up the annulus of the hole.

Drilling fluid returning from the boring contained drill cuttings, which were removed before the mud was recirculated. Equipment used to re-condition the mud for circulation included a shaker screen, a silting pit, and a desander/desilter.

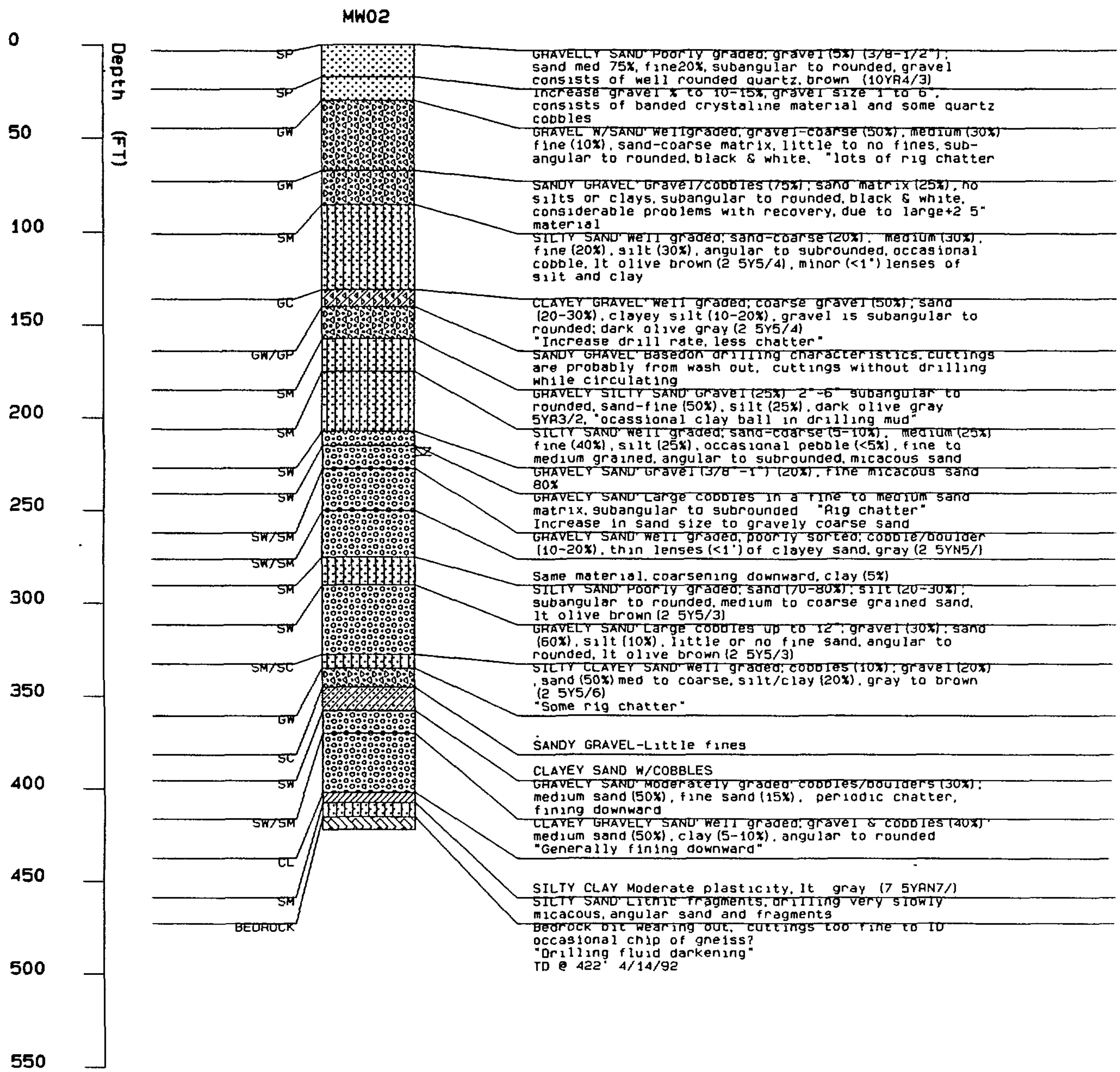
Fluid returning from the boring passed over the shaker screen which contains a sloping, vibrating 1/8-inch screen. The mud fell through the screen and returned to the mud tanks. Large solids traveled to the bottom edge of the screen where they were "dumped" into containment bins. Some of the cuttings were collected for geological examination (grab samples).

The first pit that received the drilling fluid after it left the shakers was the sand trap. The bottom of a sand trap was sloped so that particles segregated by gravity settle toward cleanout valves that were opened periodically (usually during trips) so that the solids could be dumped.

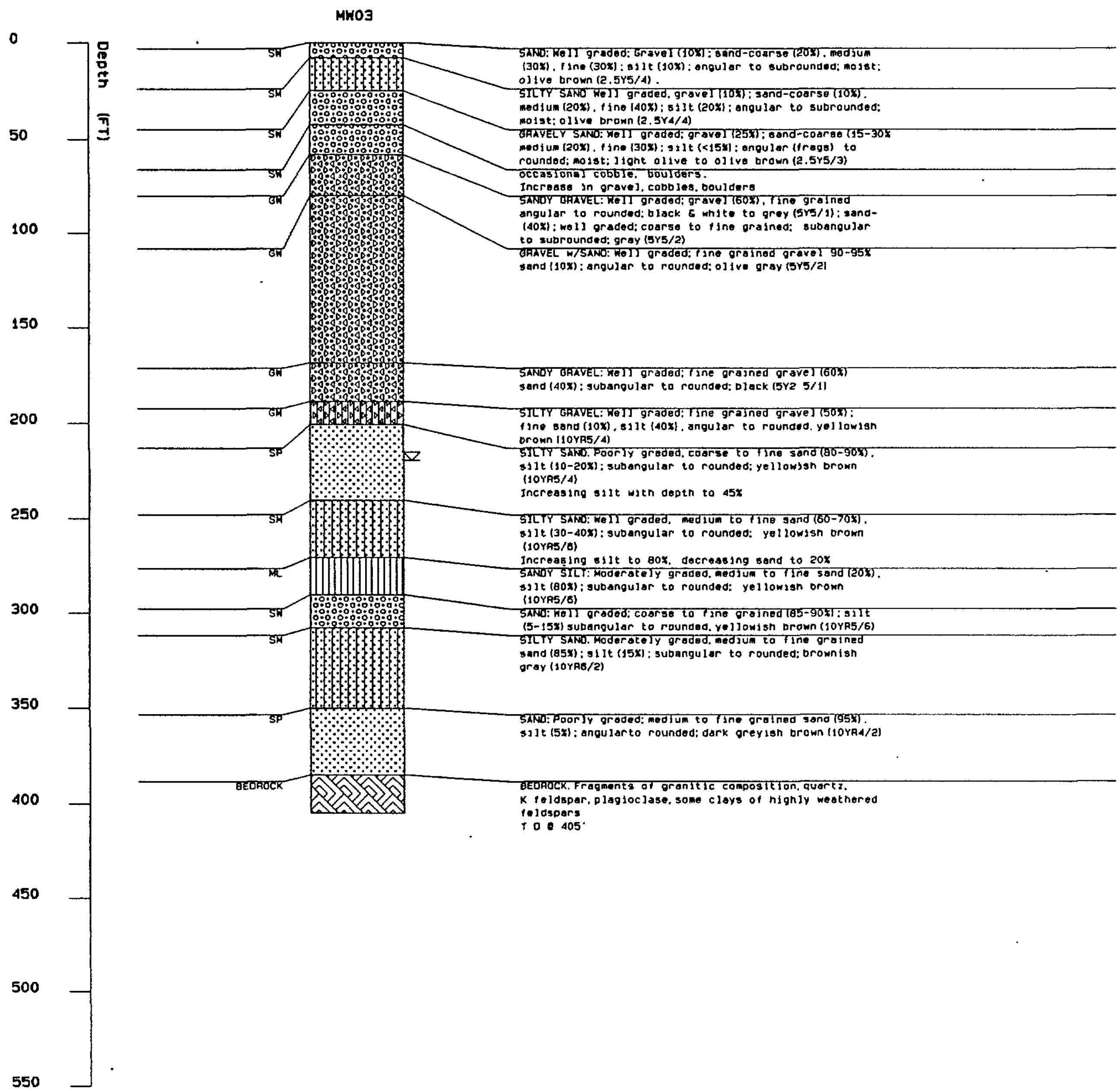
The desander and desilter separated solids using a hydroclone. A hydroclone (which has no moving parts) imparts a whirling motion to the fluid, creating sufficient centrifugal force to separate solids of various particle size. A pump was used to feed mud through a tangential opening into the large end of the cone-shaped housing. The underflow from the apex contained the coarse solids (which are discarded) while overflow, or effluent, was returned to the active mud system. Hydroclones are most effective on low-weight water-based muds to remove coarse drilled solids. Individual cones were manifolded in parallel to match the capacity of the circulation through the cone units.

During drilling, the rig crew continuously added drilling fluid to provide sufficient mud volume to fill the boring and the mud pits. Mix parameters such as mud weight, viscosity, sand content, water loss, and wall cake thickness were also monitored.

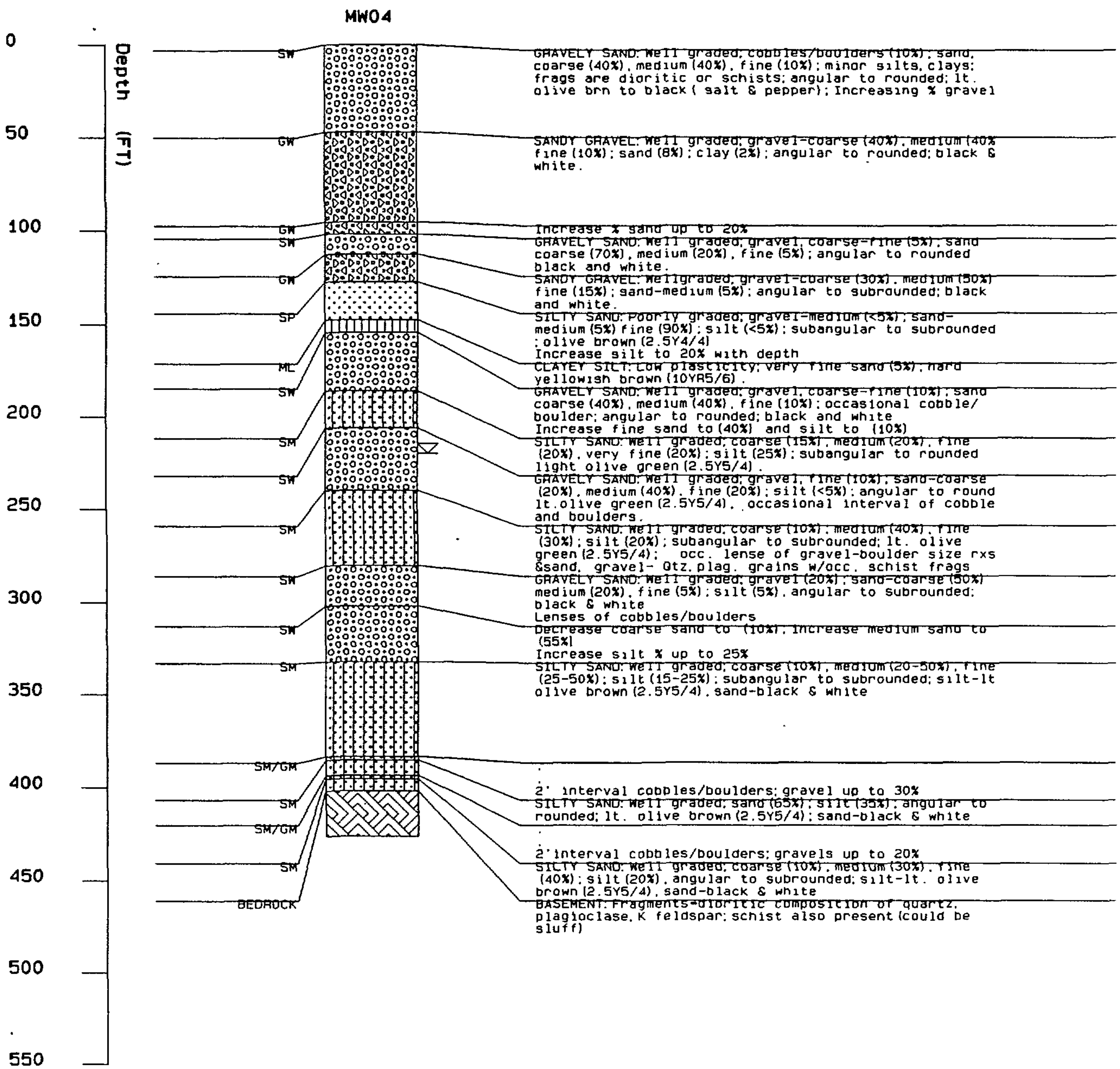
Grab samples were collected about every 10 feet from ground surface to the total depth of the boring. These samples were collected by allowing the mud flowing out of the boring to run through a hand held 1/8-inch screen, thus collecting the cuttings, or by collecting cuttings off the shaker screen. These cuttings samples were lightly washed, described on the boring logs shown in Figures 3 through 9, stored in a plastic sample box and/or a cloth sample bag, and archived for future reference. No samples were collected for chemical analysis during the augering procedure.



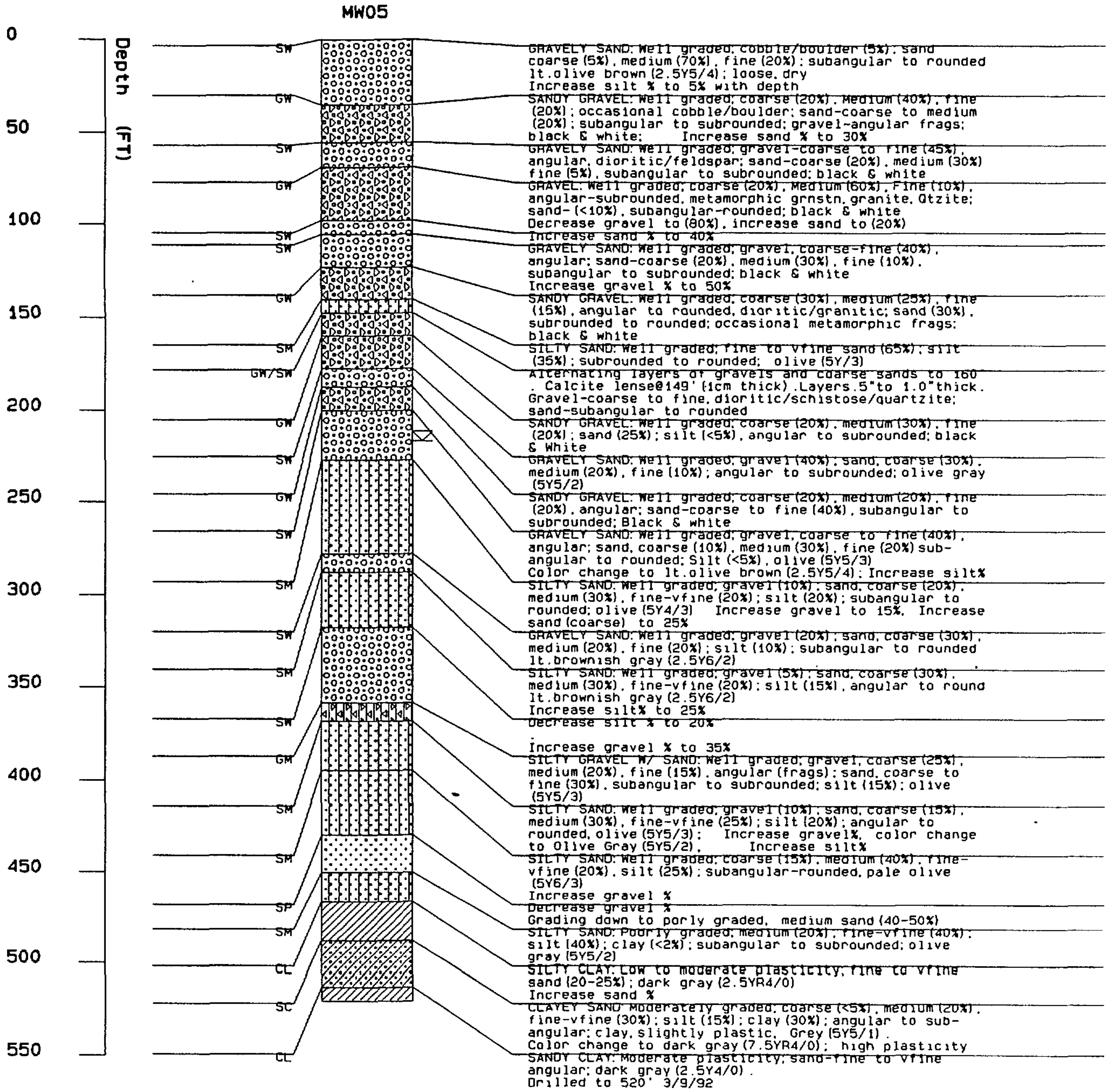
Appendix A Figure 3
Boring Log MW02
Newmark Operable Unit RI/FS Report



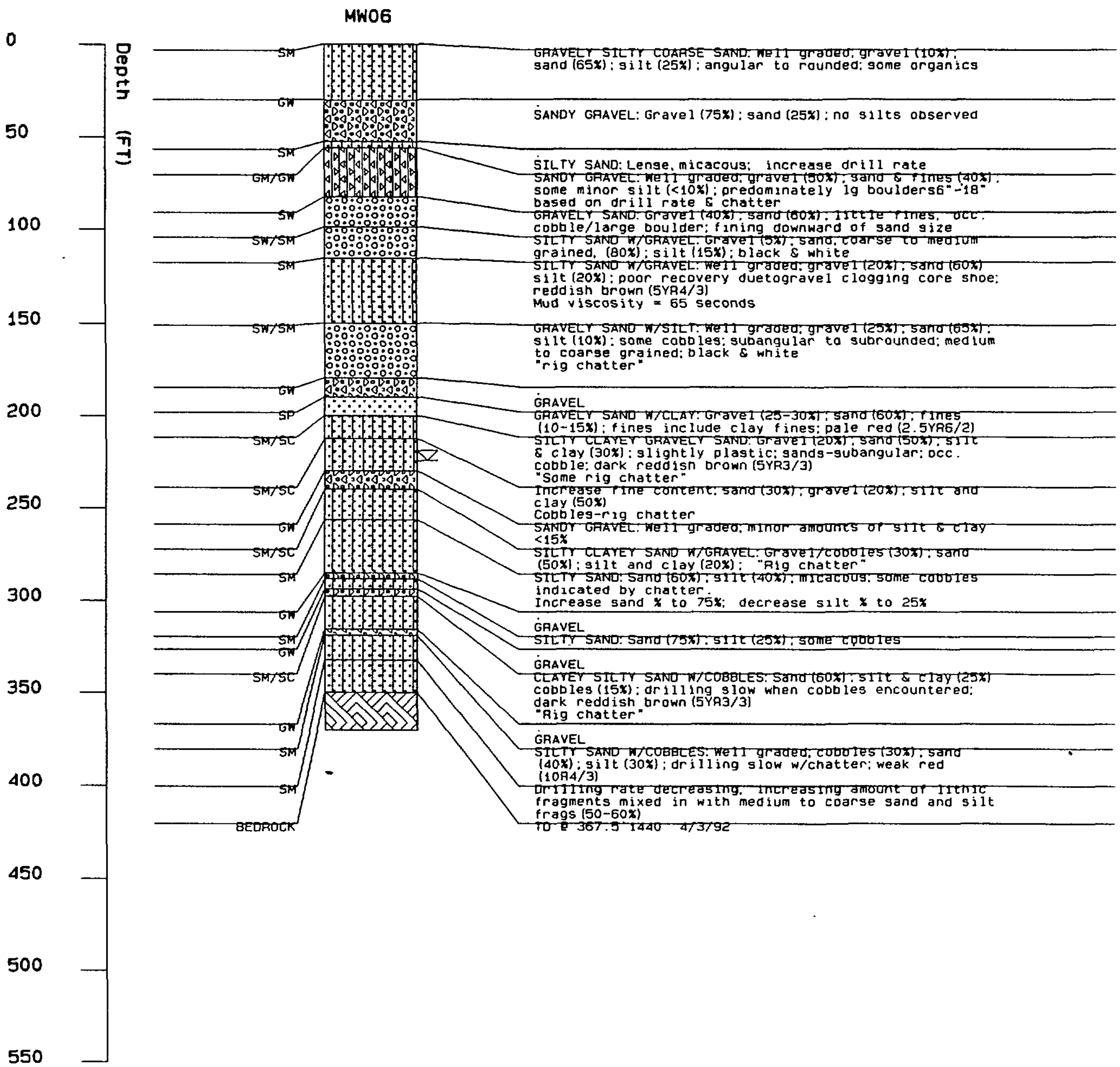
Appendix A Figure 4
Boring Log MW03
Newmark Operable Unit RI/FS Report



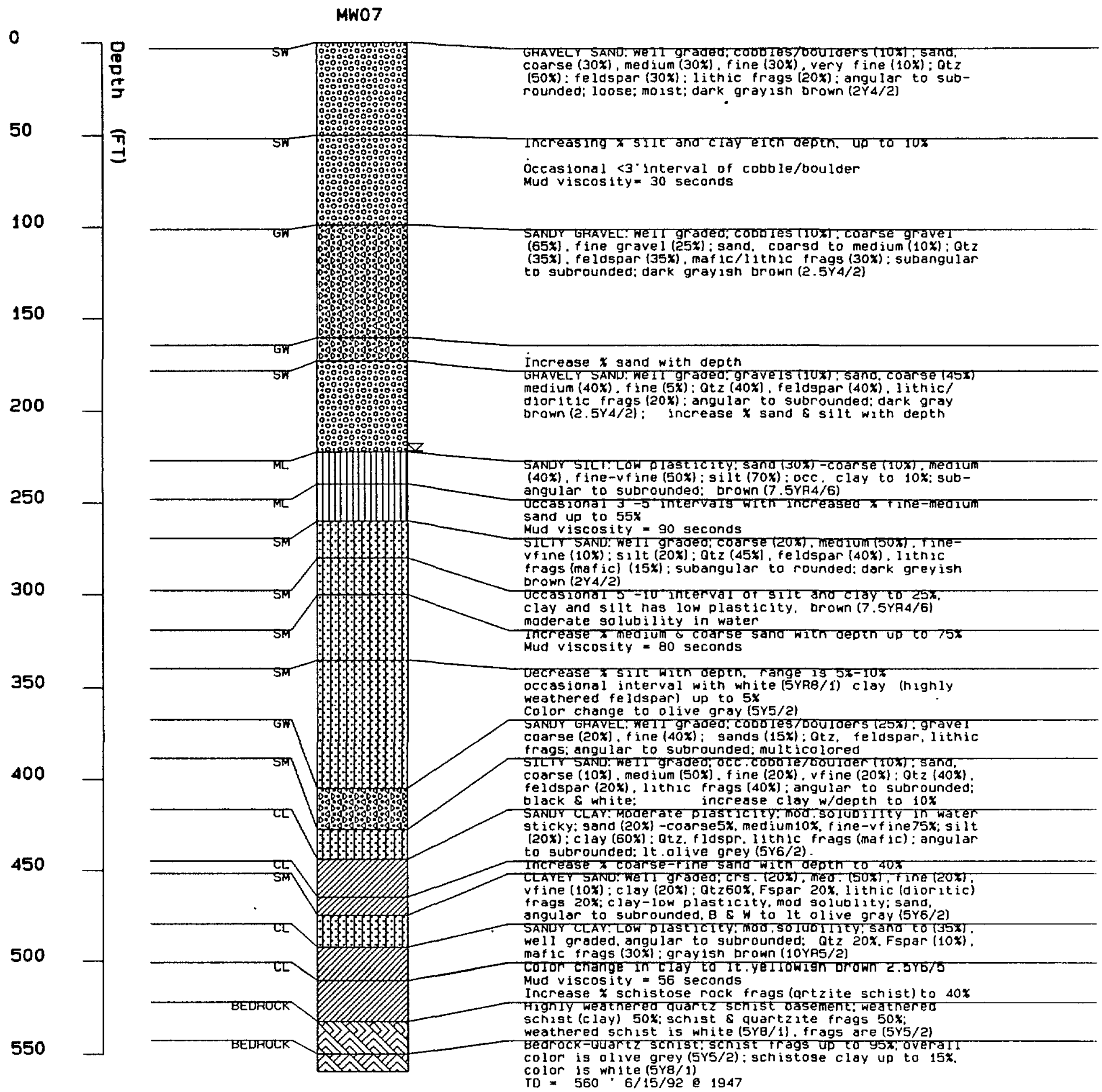
Appendix A Figure 5
Boring Log MW04
Newmark Operable Unit RI/FS Report



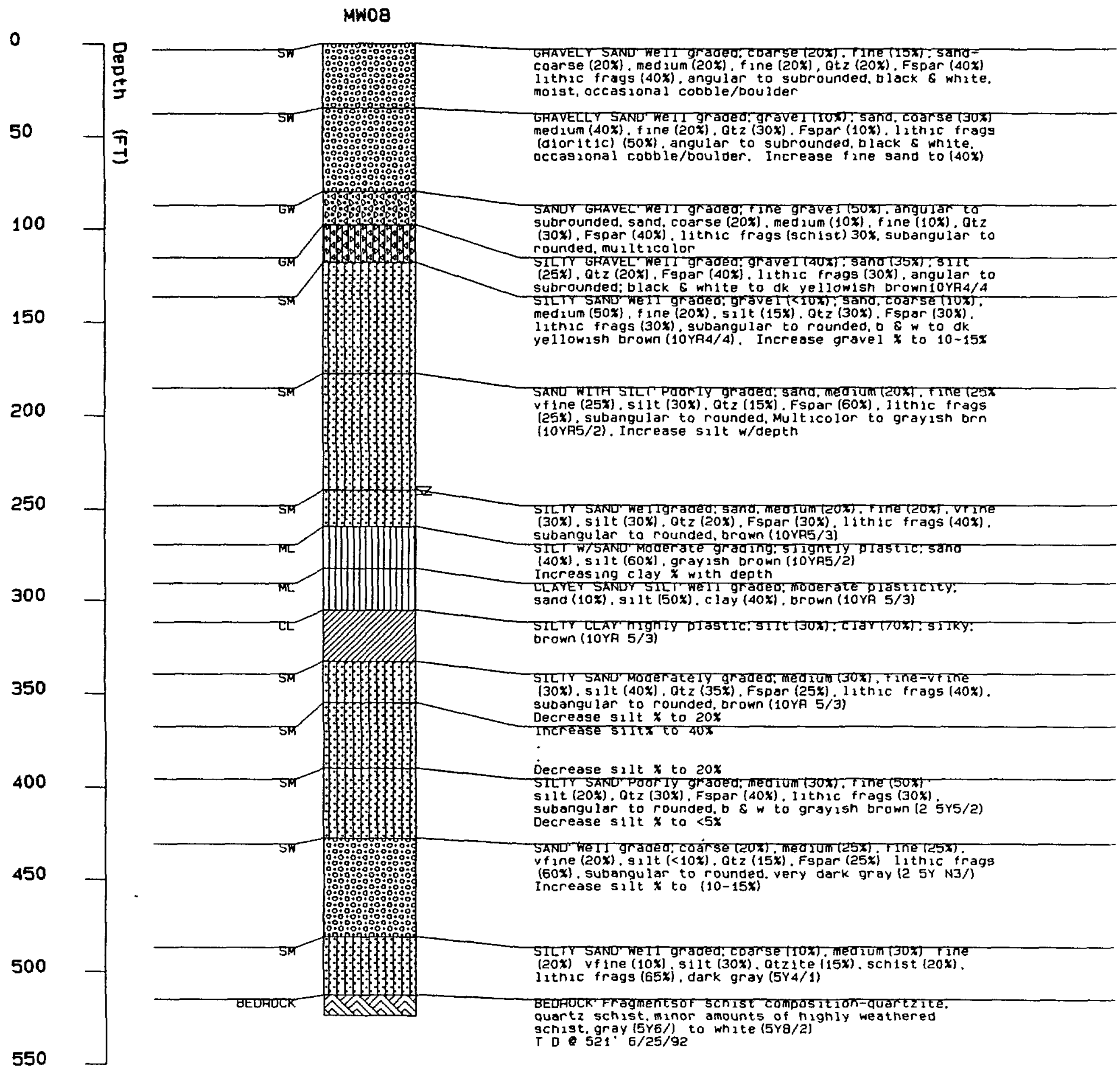
Appendix A Figure 6
Boring Log MW05
Newmark Operable Unit RI/FS Report



Appendix A Figure 7
Boring Log MW06
Newmark Operable Unit RI/FS Report



Appendix A Figure 8
Boring Log MW07
Newmark Operable Unit RI/FS Report



Appendix A Figure 9
Boring Log MW08
Newmark Operable Unit RI/FS Report

1.1.2 Plume Area Well

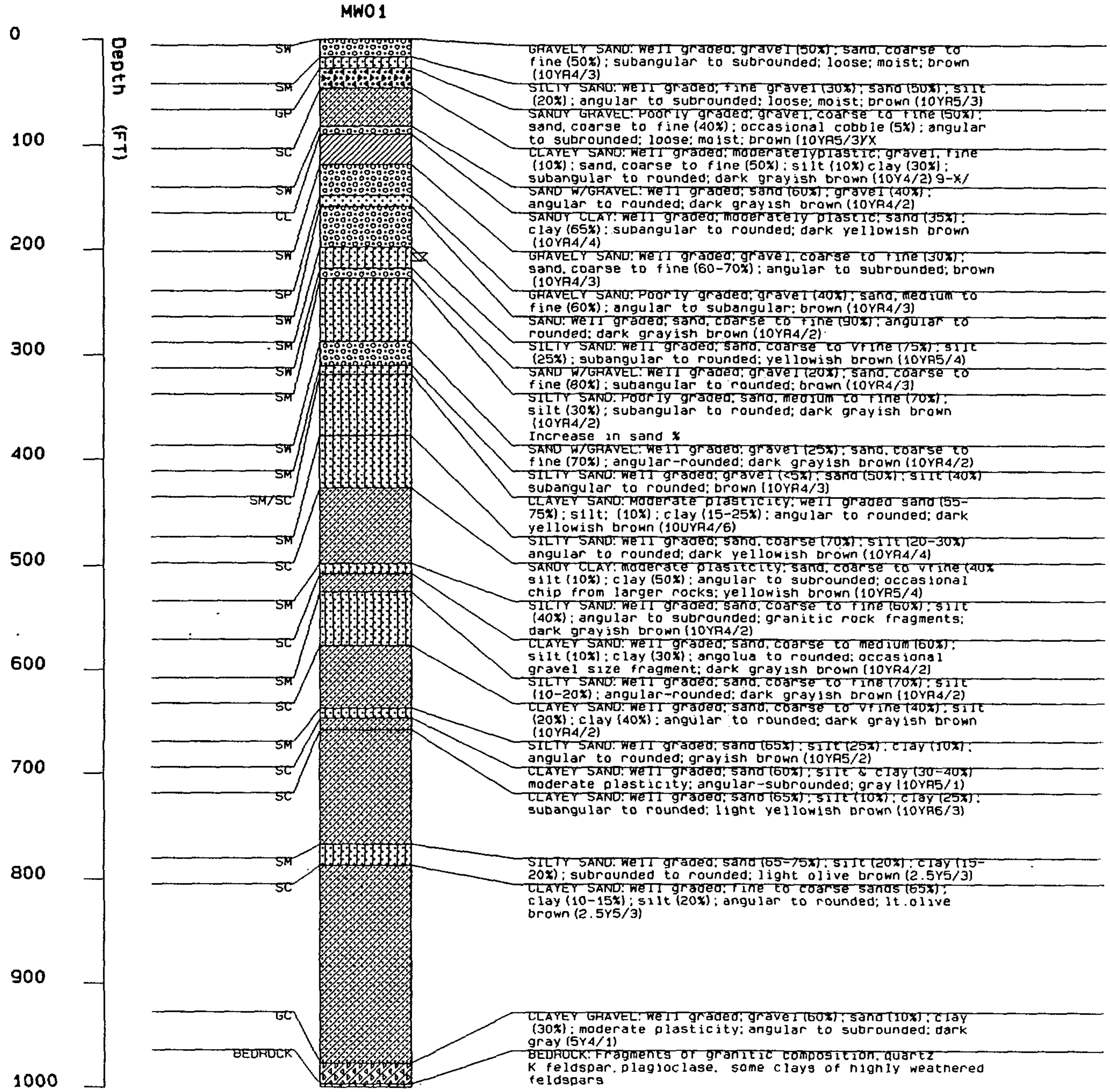
Well Drilling Procedure

The drilling of monitoring well MW01 was initiated by augering a 24-inch diameter hole to a depth of 40 feet. Drill cutting/augering samples were collected about every 10 feet, labeled, and placed in resealable plastic bags or cloth/string tie sample bags. Drill cutting/augering samples were only examined for lithologic data.

Upon completion of the 40-foot surface conductor boring, approximately 40 feet of 14-inch outside diameter ASTM Type 53 ERW B NPS conductor casing was centered and lowered to the bottom of the boring. A tremie pipe was utilized for the placement of cement into the annular space between the boring wall and conductor casing. Approximately 8-10 cubic yards of cement was placed into the annulus from the bottom of the boring to surface to secure the conductor casing. Concrete was supplied by a local ready mix plant and consisted of a 6-sack concrete mix. Concrete was allowed to set 23 hours prior to the commencement of rotary drilling operations.

After the cement truck and augering rig were removed from the site, a mud rotary rig was moved and rigged up over the boring. A mud rotary drilling technique, using 12¼-inch button or chisel tooth tri-cone drill bit, was used to drill the monitoring well boring to total depth.

Drilling fluid viscosity was maintained between 38 and 42 seconds through a marsh funnel with the weight averaging 10 lb./gallon. The circulating fluid assisted the bit in drilling the rock formation and lifting the drill cuttings up the boring annulus to the surface. The drilling fluid was treated as described for the source wells prior to recirculation. The boring log for MW01 is shown in Figure 10.



Appendix A Figure 10
Boring Log MW01
Newmark Operable Unit RI/FS Report

1.2 SOIL SAMPLING AND GEOPHYSICAL LOGGING PROCEDURE

When the appropriate depth was reached for coring, the standard drilling assembly was removed from the boring and replaced with a coring assembly. Core samples were collected using a 94-millimeter (mm) wire line core barrel sampler and/or a 2½-inch x 10 foot split spoon sampler. Core samples were collected at approximately 50 to 70 feet below ground surface (bgs) and 110 to 160 feet bgs in MW03, MW04 and MW05. Core samples were collected from 32 to 40 feet bgs, 70 to 77 feet bgs and 192 to 213 feet bgs in MW02. No core samples were collected from MW01, MW06, MW07 and MW08 since the wells were outside the suspected source area (see Figures 1 and 2).

Upon completion of a core run, the core sampler was removed from the well boring and split open. In general, core sample recovery was very poor from all source area wells for the following reasons:

- Abundant side wall slough within the boring was occurring and often the only sample recovered in the core barrel was this slough;

- Native alluvium consisted of cobble to boulder size rock. This rock was too large to fit inside the 94-mm core barrel. The rock would wedge into the cutting head and not allow native soil to enter the core barrel;

- Alluvial sediment in the source area was unconsolidated; even though a sample catcher was used, core samples were lost while pulling the core barrel out of the well bore; and

- When approximately five feet of core had entered the core barrel (10 feet of core barrel was used), the resistance of the sample inside the core barrel exceeded the competence of the alluvium and would not allow additional core to enter the core barrel. Thus even when core recovery conditions were optimum, only a maximum of 5 feet of core was recovered because of the unconsolidated nature of the alluvium.

Even with these conditions, sufficient core samples were collected to provide representative soil and chemical analytical data for each monitoring well. The higher quality core was recovered from fine-grained zones. All recovered material was field screened for VOCs with a photo-ionization detector, placed in 8-ounce jars with Teflon®-lined lids, and logged on the appropriate field form. The jars were placed in an ice chest cooled with blue ice, transported to the field office under chain-of-custody protocol, and submitted to the mobile laboratory, and/or prepared for shipment to the EPA Region IX laboratory, for analysis (Newmark Sample Plan, p. 86, URS 1992). Excess core samples not chosen for laboratory analysis were archived for future reference.

Since field screening of core and grab samples collected from MW02 through MW05 showed no indication of contamination, all core and grab samples collected were archived. The selection of one sample for laboratory analysis was made when all archive samples from a 100-foot interval had been screened. Since field screening did not indicate the presence of contamination in any of the soil samples, the following rationales were considered in selecting samples for analysis:

- Vertical distribution. If sample type, quality, and recovery permitted, analytical samples were chosen at evenly spaced intervals from ground surface to the groundwater table. This method was used to provide maximum analytical data while minimizing the number of samples required;

- Sample material. If possible, samples consisting of finer-grained sediments were chosen for submittal to the laboratory for analysis. Medium to coarse gravels, cobbles, and boulders were not submitted for analysis. This procedure was followed because of the poor core recovery experienced with the coarse sediments and because there is a higher likelihood that chemical analysis would detect contaminants in the finer-grained sediments;

- Proximity to clay layers. Whenever possible, soil samples collected from the upper portion of a clay horizon or just above the clay horizon were chosen for laboratory analysis. This procedure was followed to provide soil data in sediments which could possibly retard downward migration of contaminants and create an increase in contaminant concentration; and

- Core recovery. Due to the coarse grained nature of the source area, alluvial core recovery was a major factor in sample selection. In most of the core runs attempted, sample recovery was very poor to none at all. Only core samples which provided sufficient volume to complete the required laboratory analysis were selected. Care was also taken to select only core samples which best represent an undisturbed section of the alluvium.

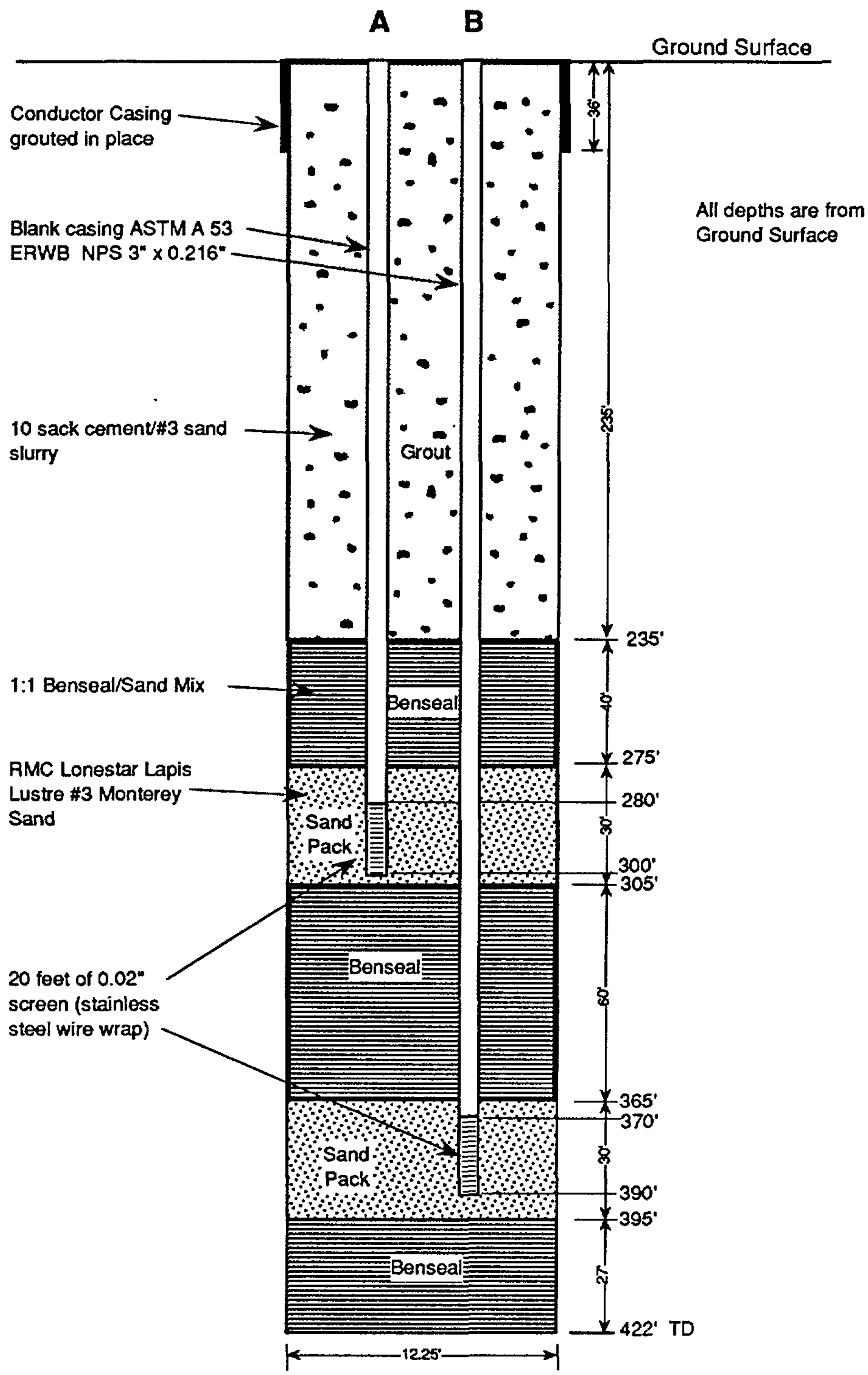
Two (2) samples were selected for analysis by the Field Analytical Support Program (FASP) mobile laboratory, and the EPA Region IX laboratory, from wells MW03, MW04, and MW05. Because MW02 was near a suspected source, seven samples were selected for analysis by the FASP mobile laboratory and five were selected for analysis by the EPA Region IX laboratory.

The mobile laboratory analyzed the selected samples for halogenated VOCs, aromatic VOCs, and total petroleum hydrocarbons (TPH). Soil samples selected for analysis by the EPA Region IX laboratory were analyzed for TCL VOAs, base neutral acids, pesticides and PCBs, and metals, including mercury.

When a coring run was complete, the core assembly was removed from the boring and replaced with the standard drilling assembly. The cored interval was reamed out using a 12¼-inch drill bit and drilling continued to the next coring interval or to the total depth of the well boring. Source area wells reached total depth between 365 to 561 feet bgs. (See Figures 3 through 10 for boring logs and Figures 11 through 18 for well completion diagrams.) The plume area well reached a depth of 1,000 feet.

When total depth was reached, the drill bit was lifted approximately two feet off bottom and all cuttings were circulated out of the boring. Once the boring was clear, all drill pipe and the drilling assembly were removed in preparation for geophysical logging.

Geophysical logs were reviewed for characteristic signals or patterns that would correspond to the varying lithologic conditions found in the area. These logs were compared to the soil/rock samples collected so the lithology drilled could be further identified on the logs. The combination of fresh water mud rotary drilling and the discontinuity of strata made interpretations of the geophysical logs and their relation to coarse-grained, high transmissive, water bearing zones versus fine grained (silts and clays), lower transmissive zones difficult.



Appendix A Figure 11

MW02 A & B Well Design

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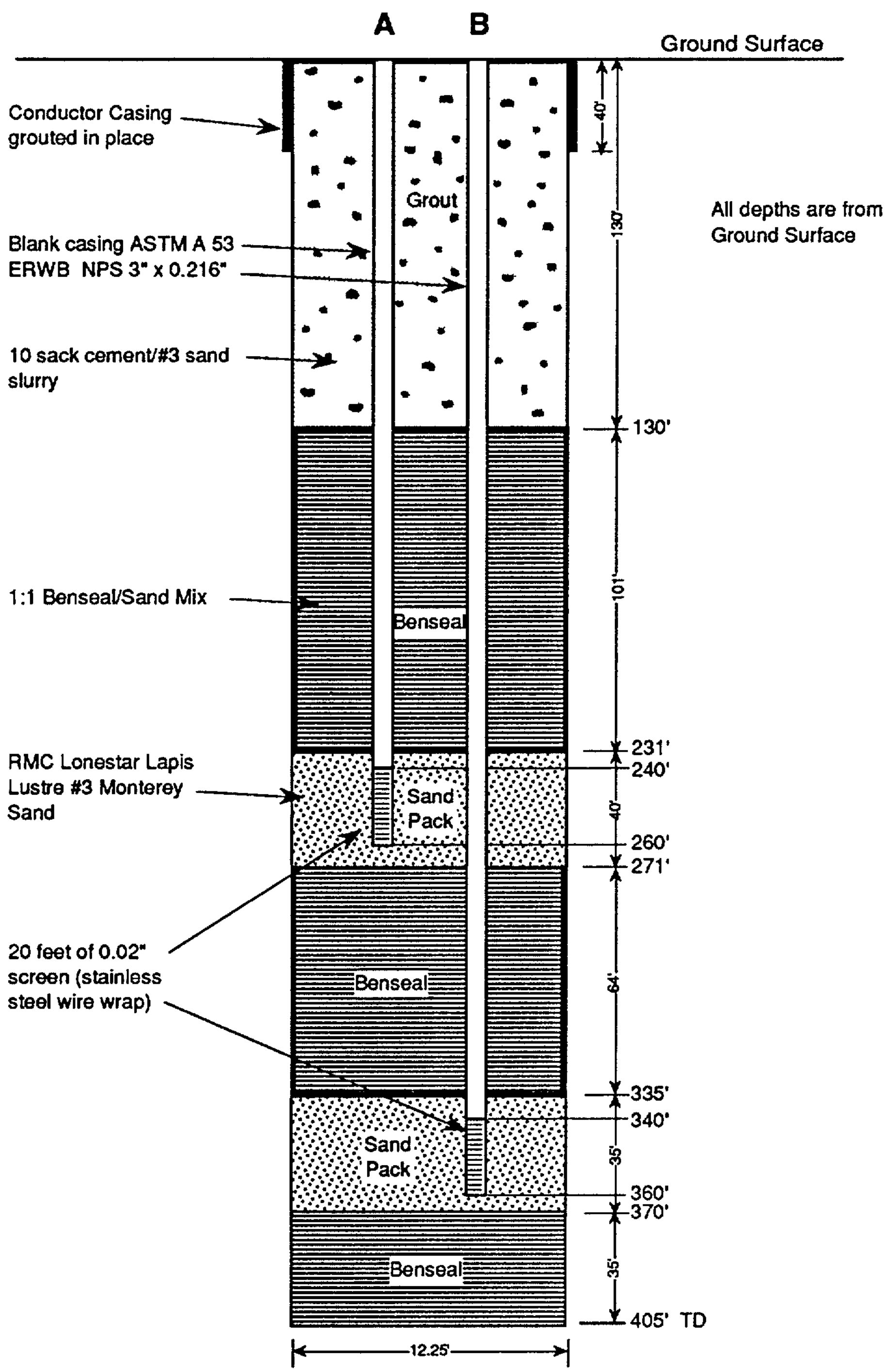

Appendix A Figure 12

MW03 A & B Well Design

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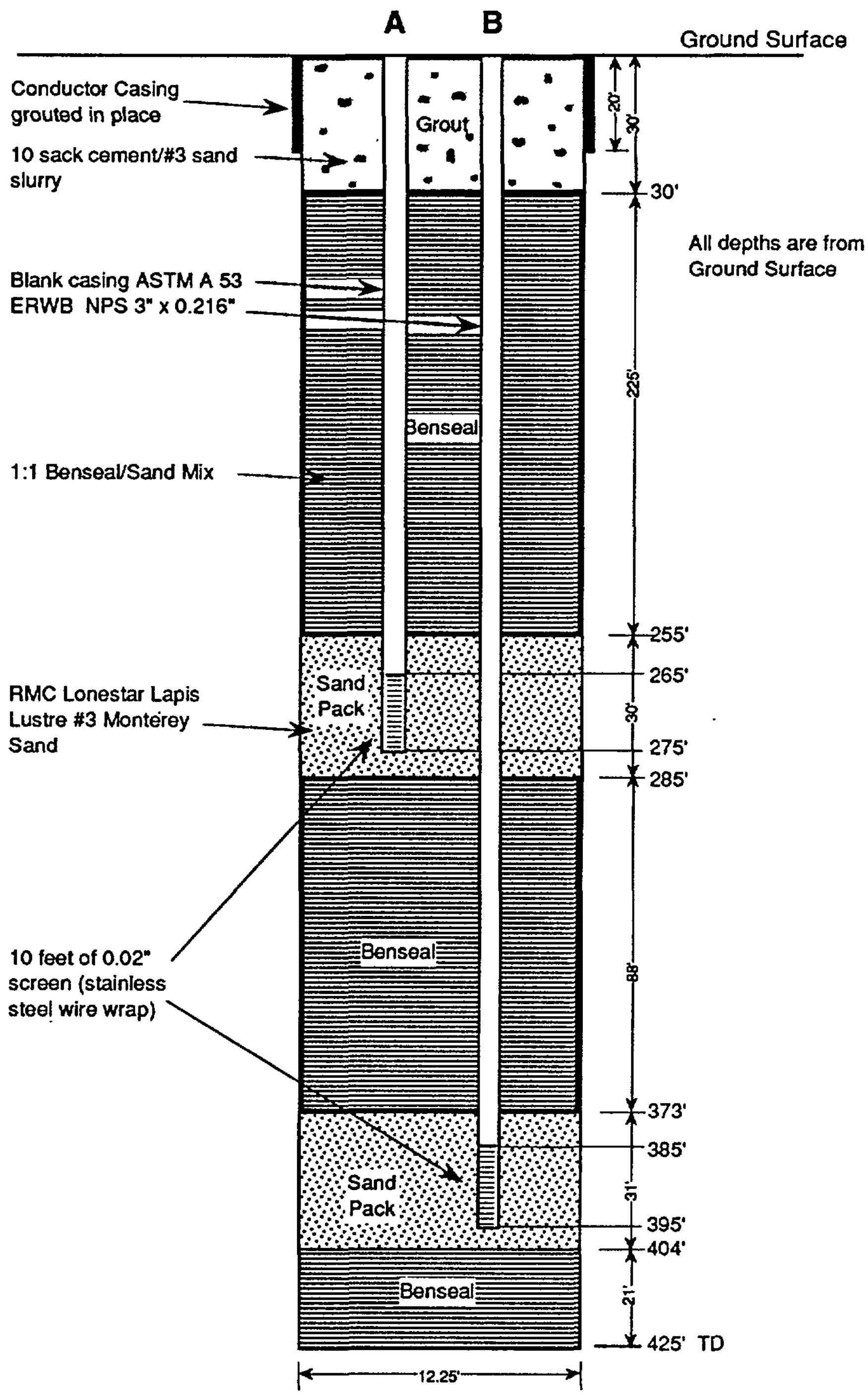
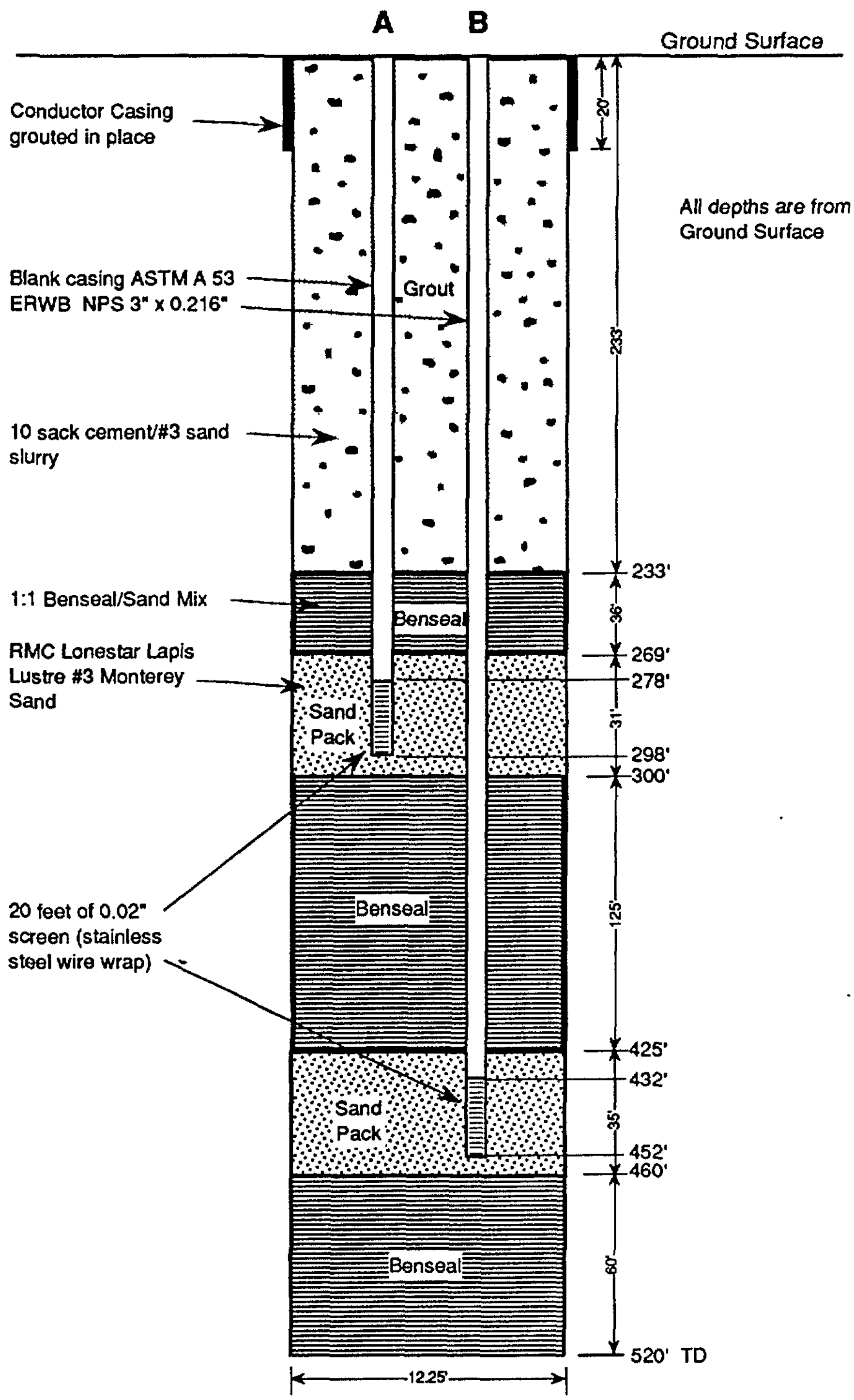


Appendix A Figure 13
MW04 A & B Well Design
Newmark Operable Unit RI/FS Report
Not to Scale



Appendix A Figure 14

MW05 A & B Well Design

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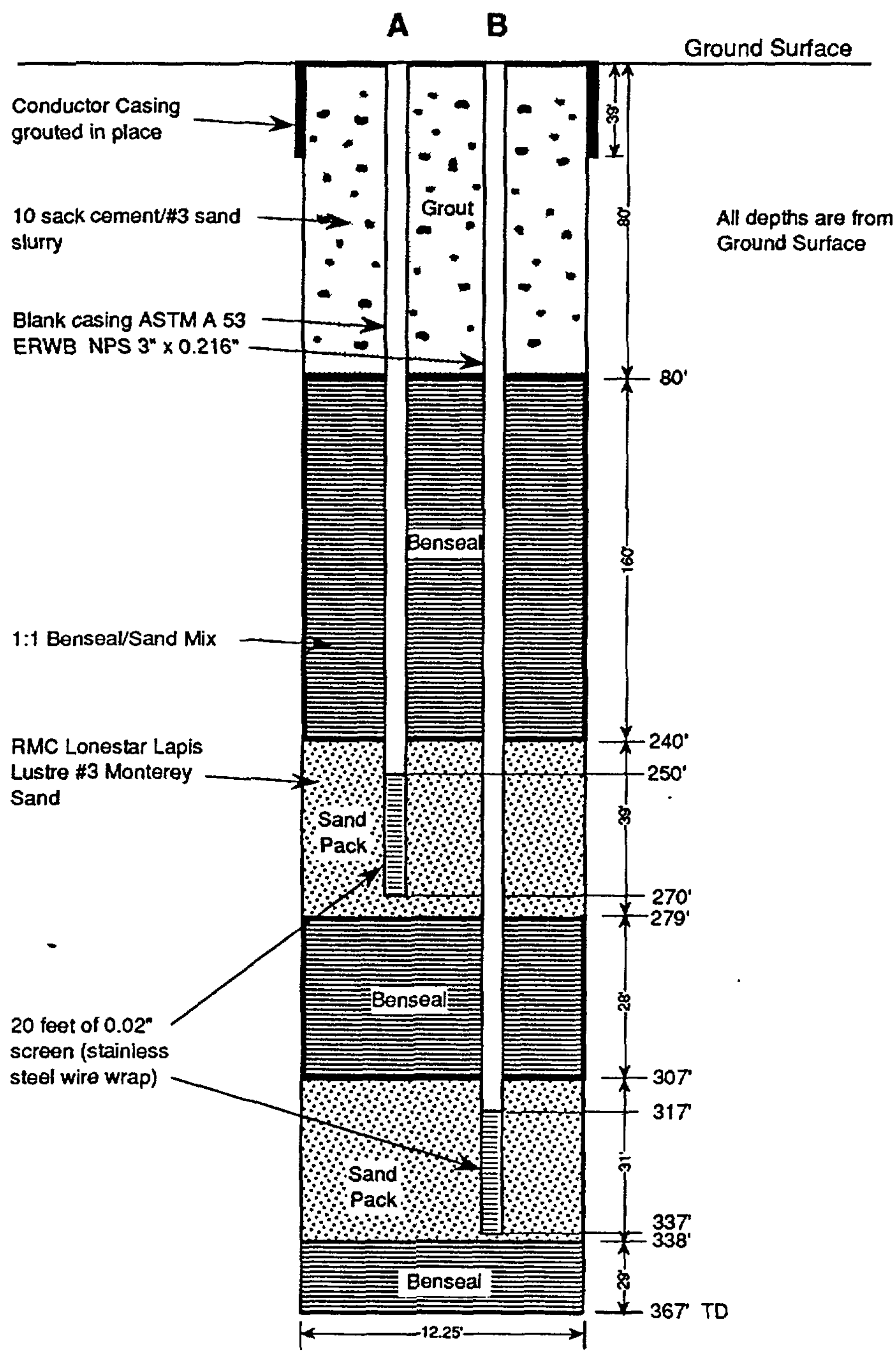

Appendix A Figure 15

MW06 A & B Well Design

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1.3 MONITORING WELL INSTALLATION

1.3.1 Source Area Well Installation

Upon completion of geophysical logging at each monitoring well, all geologic, hydrogeologic and geophysical data available were combined and a detailed analysis of the well was performed. Based on the results of this analysis, screen intervals were chosen for each monitoring well (see Table 1 and Figures 11 through 17). In accordance with the sample plan, the (deeper) B monitoring wells at locations MW02, MW03, MW04, MW06, MW07, and MW08 were screened at, or just above, the aquifer/bedrock interface.

Monitoring well MW05 was the only exception to the sample plan. Well boring MW05 was scheduled for a maximum total depth of 500 feet bgs, the anticipated depth to bedrock. The well was drilled to a total depth of 520 feet without encountering bedrock. The decision was made to drill no deeper and proceed with constructing the well. MW05B was screened from 432 to 452 feet bgs. Geophysical log signature across the screened interval consisted of elevated resistivity on both the guard resistivity log and on the E-log (16 inch and 64 inch normal). The elevated resistivity was identified as a silty sand on the boring log.

Just below the screened interval in well boring MW05 (approximately 453 to 470 feet bgs), a sharp drop in both the guard and E-log (16 inch and 64 inch normal) resistivity occurred. This change in resistivity indicated the presence of a zone with a lower porosity and permeability. The zone is identified on the boring log as a silty clay. Because the clay horizon could potentially retard downward migration of contaminants, the decision was made to screen MW05B at the sand/clay interface.

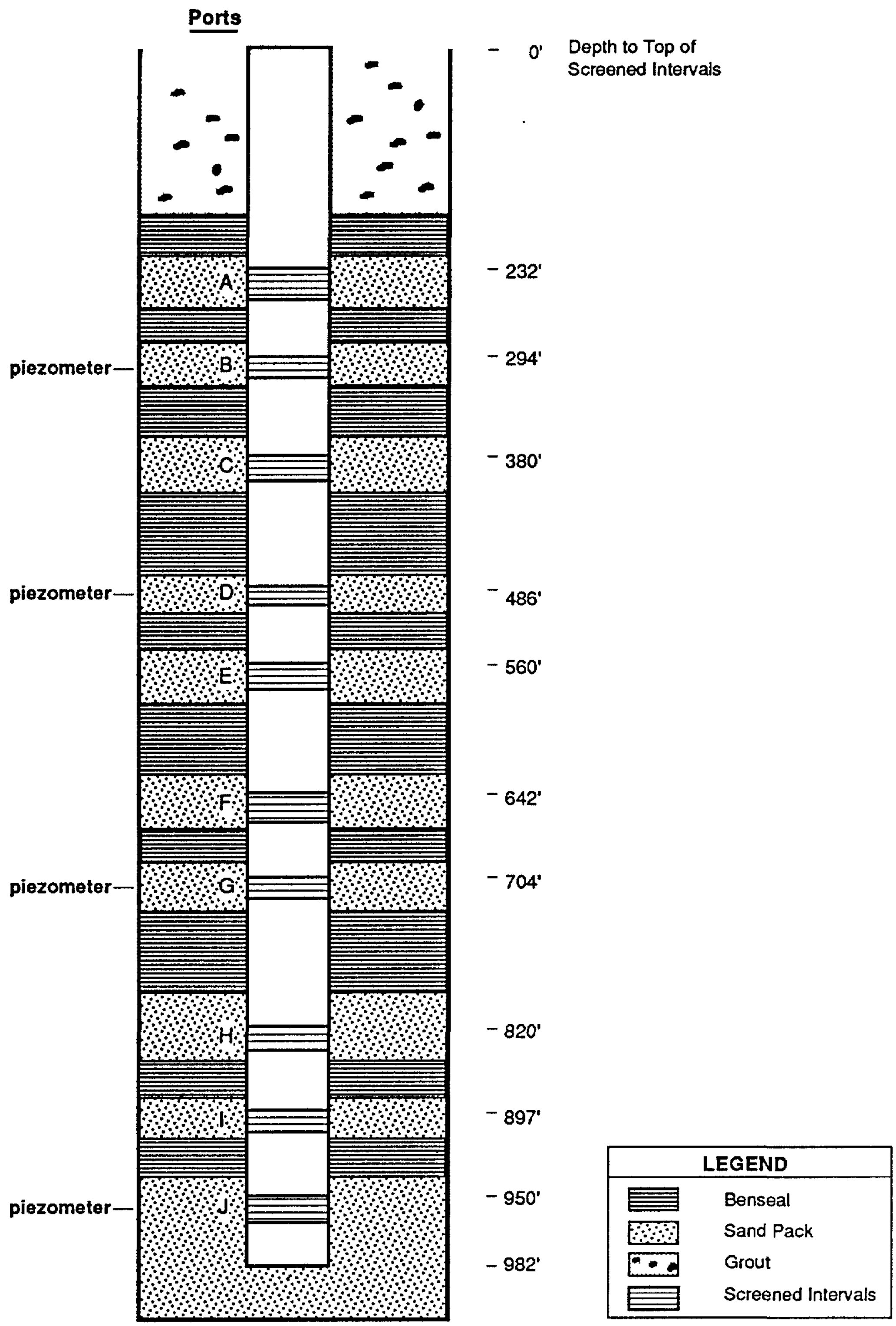
Each shallow A monitoring well was screened in the upper 25% of the aquifer. Within the top 25% of the aquifer, a screen interval was chosen to provide high enough porosity and permeability (sand or gravel) to allow sufficient water flow for sampling. Wherever possible, a screened interval was chosen that overlaid a lower porosity and permeability horizon (clay or silt) to allow sampling of groundwater at the sand/clay interface. Descriptions of the shallow screened intervals for MW02A through MW08A are provided below.

Appendix A

Table 1

MONITORING WELL DATA
SOURCE AREA

Well	Elevation Ground Surface (ft)	Elevation Top of Casing (ft)	Depth to Water (ft)	Elevation Static Water Level (ft)	Screened Interval (ft)		Total Depth (ft)
					From	To	
MW02A	1413.75	1413.15	221.68	1191.47	280	300	422
MW02B		1413.16	222.39	1190.77	370	390	
MW03A	1418.21	1417.50	219.58	1197.92	240	260	395
MW03B		1417.49	220.28	1197.21	340	360	
MW04A	1410.72	1410.05	219.68	1190.37	265	275	427
MW04B		1410.00	220.21	1189.79	385	395	
MW05A	1403.58	1402.85	217.17	1185.68	278	298	520
MW05B		1402.87	217.21	1185.66	432	452	
MW06A	1435.88	1435.45	224.20	1211.25	250	270	367.50
MW06B		1435.41	225.34	1210.07	320	340	
MW07A	1436.03	1435.55	227.65	1207.90	305	325	561
MW07B		1435.53	222.28	1213.25	486	506	
MW08A	1475.07	1474.23	242.65	1231.58	275	295	521
MW08B		1474.19	251.07	1223.12	470	490	



Appendix A Figure 18

MW01 Construction Detail

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Not to Scale

URS Consultants

Geophysical logs (Appendix B) were run as follows:

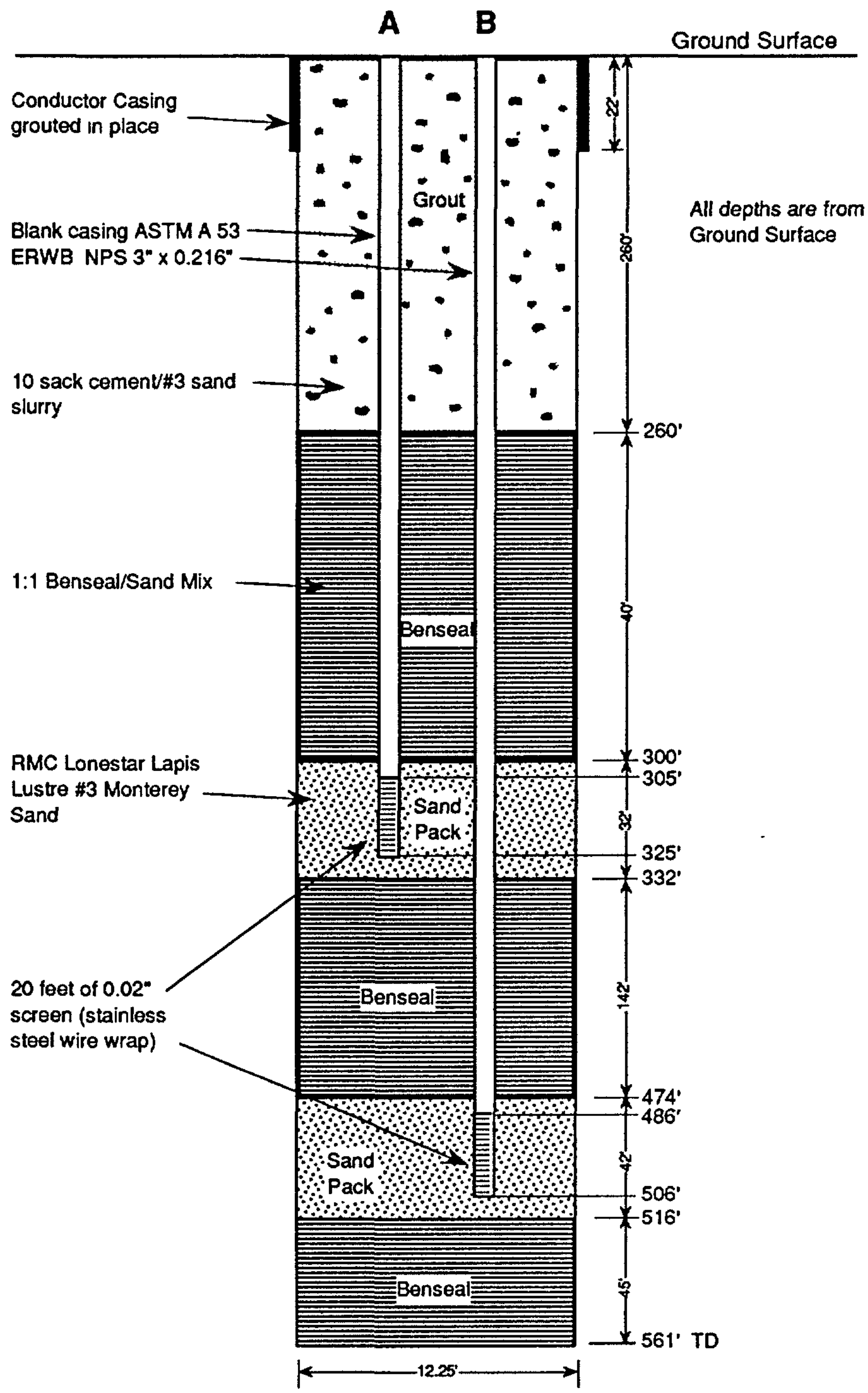
- Electric Log with Specific Potential (SP) - Total depth to base of conductor casing
- Gamma Ray Log - Total depth to base of conductor casing
- Guard Resistivity Log - Total depth to base of conductor casing
- Caliper Log - Total depth to base of conductor casing
- Temperature Log - Total depth to base of conductor casing

The Electric Log with SP is useful in verifying the electrical values seen on the Gamma Ray/Guard Resistivity log. Although the values on the electrical log are muted, correlations can be made and electrical resistivity values can be cross-referenced. The SP log is not of much analytical value in alluvial deposits but does provide information useful in correlating electrical logs between different wells.

The Gamma Ray/Guard Resistivity log is useful in defining the lithology of the boring when correlated with the sample log. Direct comparisons can be made and individual zones can be defined. As an example, the zone at 560 feet on the log for MW03 is a good correlation with the clayey sand as identified on the sample log.

The Caliper log is vital in determining the quality and reliability of the balance of the logging data. If the caliper indicates a smooth, consistent sized boring, then the data are valid and would not need any corrections for deviated boring size. Additionally, the caliper log is used to estimate volume of sand pack and seal material needed to complete well construction.

The Temperature log measures well boring temperature and the differential temperature between the drilling fluid in the boring versus the temperature of the drilled rock formation. Variances in temperature (formation temperature is lower than well bore temperature) are good indications of water bearing zone.



Appendix A Figure 16

MW07 A & B Well Design

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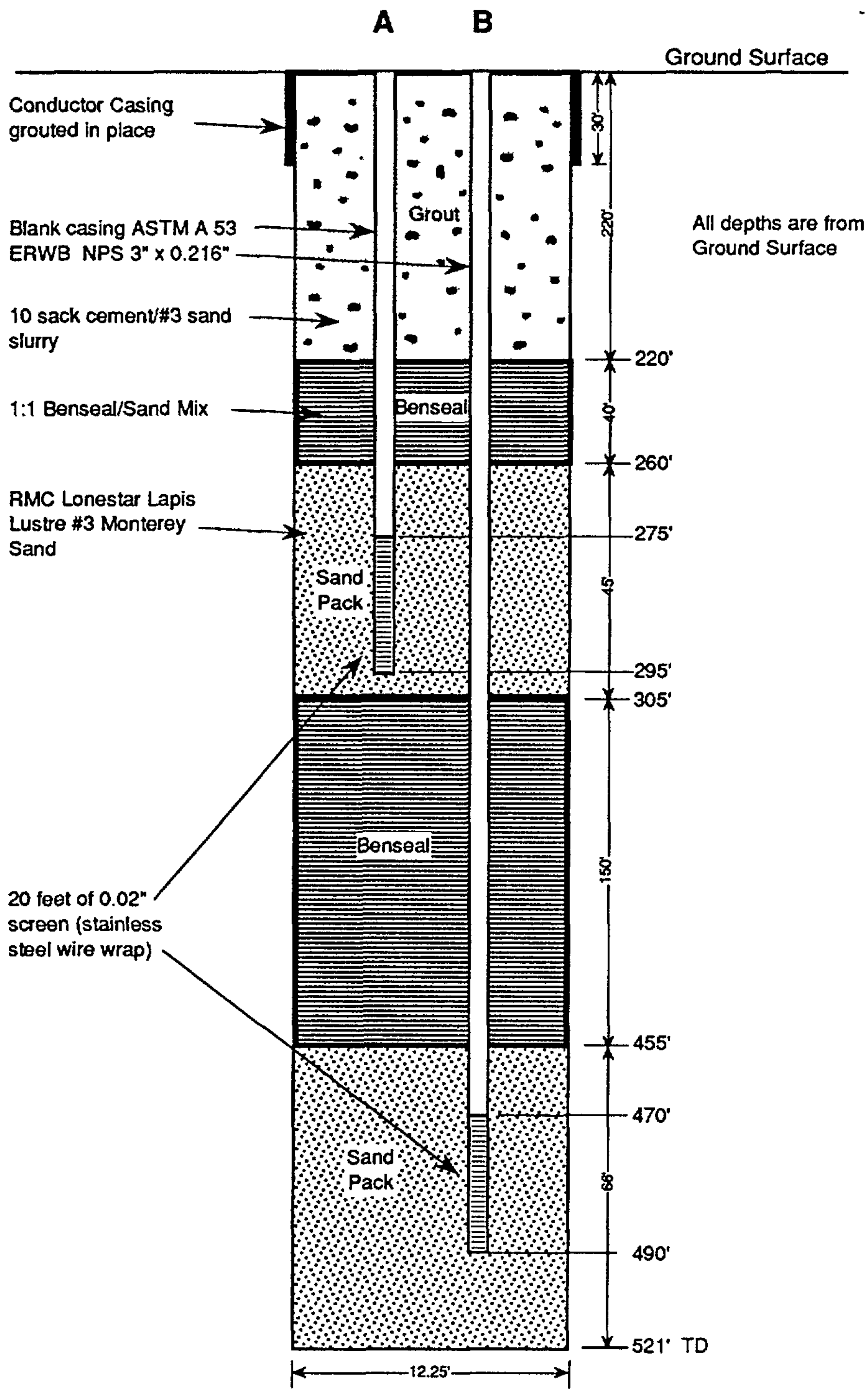

Appendix A Figure 17

MW08 Well Design

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Not to Scale

MW02A: Screened from 280 to 300 feet bgs. The geophysical log signature consisted of multiple 2- to 4-foot horizons of high (190 OHM/meter [OHM/M]) and moderate (118 OHM/M) guard resistivity. The boring log identified sediments in this interval as silty sands. No substantial silt or clay horizon was present in the upper 25% of the aquifer.

MW03A: Screened from 240 to 260 feet bgs. Geophysical log signature consisted of multiple 1- to 2-foot horizons of low (85 OHM/M) to moderate (108 OHM/M) guard resistivity. An increase in guard resistivity between 240 to 249 feet bgs indicated a possible increase in sand content. The screened interval was identified as sandy silt and silty sand on the boring log. A review of the geophysical logs indicated that no substantial zone of sand with minimal fine material was present in the upper 25% of the aquifer.

MW04A: Screened from 265 to 275 feet bgs. Geophysical log signatur consisted of moderate guard resistivity ranging from 130 OHMS/M to 160 OHMS/M. Lithology of the screened interval was identified as a silty sand. No significant clay layer was observed on the geophysical logs or in drill cuttings in the upper 25% of the aquifer.

MW05A: Screened from 278 to 298 feet bgs. Geophysical log signature consisted of multiple 1- to 4-foot horizons of moderate (130 OHMS/M) to high (215 OHMS/M) guard resistivity. The screened interval was identified as a gravelly sand grading to a silty sand at the bottom. The screened interval overlaid an eight foot horizon which exhibited lower resistivity and was probably a sandy silt or sandy clay horizon.

MW06A: Screened from 250 to 270 feet bgs. Geophysical log signature consisted of two distinct moderate (115 OHM/M) to high (270 OHM/M) guard resistivity intervals, separated by a 3- to 4-foot interval of approximately 150 OHMS/M. Boring logs indicated that the lithology of the screened interval consisted of silty sands and silty clay. The screened interval appeared to overlay a sandy clay horizon represented on the guard log as a moderate resistivity interval (100 to 140 OHMS/M) from 182 to 276 feet bgs.

MW07A: Screened from 305 to 325 feet bgs. The geophysical log signature consisted of multiple 1- to 2-foot horizons of moderate guard resistivity (140 to 150 OHMS/M). Lithology of the screened interval is identified on the boring log as silty sand. No substantial silty or clay horizon was observed in the upper 25% of the aquifer.

MW08A: Screened from 275 to 295 feet bgs. Geophysical log signature consisted of multiple 1- to 2-foot intervals of low guard resistivity (60 to 100 OHMS/meter). The boring log identified this interval as silt with sand and silt with clay.

Prior to construction of each monitoring well, a 2-inch diameter threaded construction tremie pipe was lowered into the boring. Each section of the tremie pipe was secured to the rig using slips, whereupon another section of pipe was added. Each section of the tremie pipe was measured to the nearest 0.01 feet (average length of 20 feet); all were numbered and labelled in sequence, during installation, to track the total pipe length and depth. Once the tremie pipe was placed near the bottom of the boring, the drilling mud was thinned by circulating clean water into the mud tanks, and pumped through the boring via the tremie pipe to facilitate well construction.

Each length of blank casing and screen was inspected for defect and/or contamination prior to installation. Each section was measured to the nearest 0.01 foot and lengths were tabulated by URS field personnel to calculate the total depth of the pipe. The screened intervals for the monitoring wells were made up of 20-foot sections of 0.02-inch continuous wrap stainless steel screen. Monitoring well MW04 was the only exception and was constructed with 10-foot sections of the stainless steel screen. All blank casing consisted of ASTM A53 ERW B NPS milled steel in 21- or 41-foot sections.

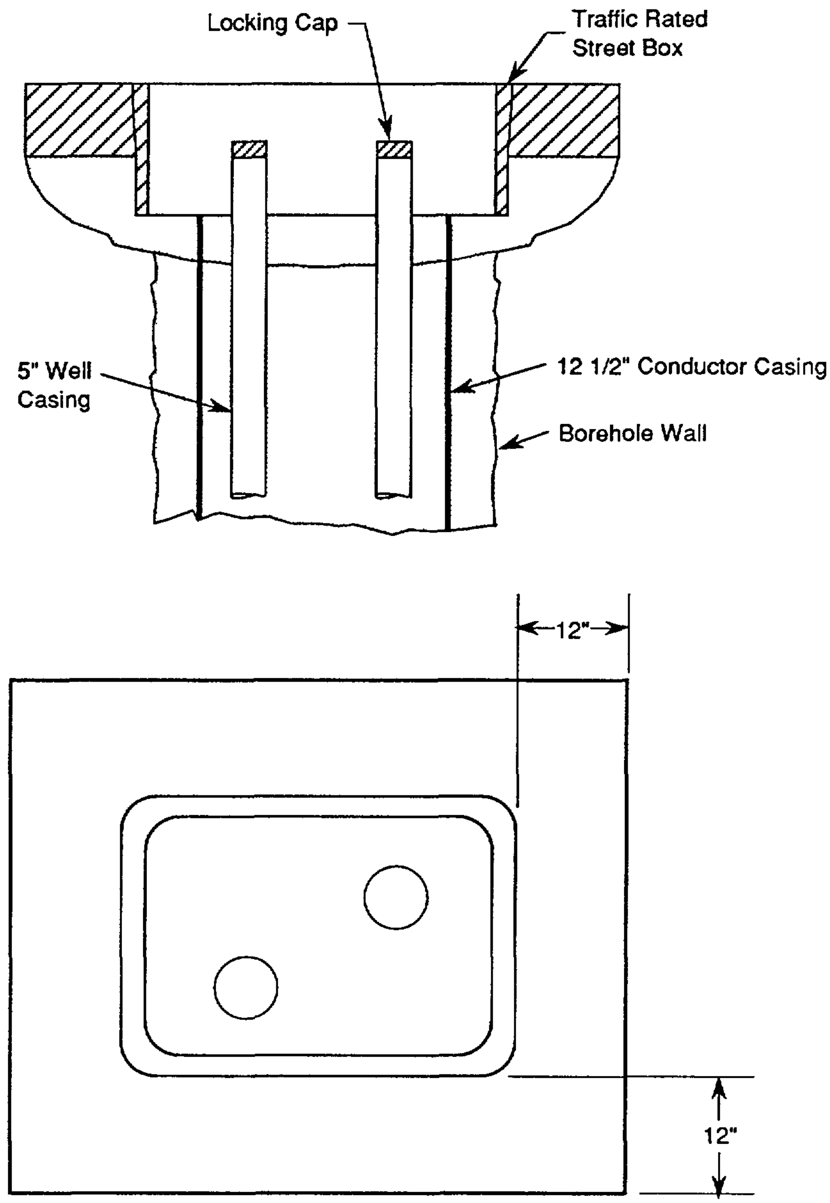
Installation of the nested well casing for the suspected source area wells began with the section of stainless steel screen. A bottom cap was welded to the end of the section. The screen was secured to a set of 3½-inch elevator blocks and lowered into the boring. A single joint of blank casing was then secured to a second set of elevator blocks and lifted into position for welding. As each section of blank pipe was added to the well string, the joints were butt welded and inspected by URS field personnel before the section was lowered. Upon reaching the targeted depth for the screened intervals (Table 1), the well casing was landed on the conductor casing. Installation of the deeper or B well casing preceded the installation of the shallower or A well casing for each monitoring well.

Placement of the annular materials followed the installation of the nested well casings. Monitoring well construction material was dry mixed at the surface and fed through a hopper into a pump using water from the local municipal water supply. Construction material consisted of a benseal and #3 silica sand mixture (1:1) for the annular seal and a well-rounded #3 monterey sand for the sand pack portion of the well.

The annular seal was placed at the bottom of the borehole via the tremie pipe, which was kept a maximum of twenty feet above the rising annulus material, but below the screened interval. The annular seal was brought to within 10 feet of the bottom of the lower screened interval. The sand pack was placed from about 10 feet below to approximately ten feet above the top of each screened interval. At the completion of each lift, all depths were verified by measuring the depth to the top of the benseal and/or sand pack by running a wire line measuring device through the tremie pipe. Upon verification of the placement of the sand pack, a sanitary seal of about 40 feet of benseal was emplaced and the depth verified. The annular seal was allowed to set for a minimum of two hours before placement of a grout seal. The grout seal extended from the top of the sanitary seal to approximately three feet below the surface. The grout seal, consisting of a 10-sack cement/sand mix with a slump of 4.00 seconds, was pumped through the tremie pipe (see Figure 3).

After the placement of the grout seal, the drilling rig and pumping equipment were removed and the grout seal was allowed to set up for a minimum of two hours before the conductor casing and well casings were cut off below ground surface. The well head was then completed using a traffic rated street box as shown in Figure 18. Detailed well construction information was logged in URS field notebooks. The well construction diagrams are presented in Figures 11 through 17.

On June 28, 1992 at approximately 8:00 a.m., an earthquake of magnitude 6.5 (on the Richter scale) occurred in the San Bernardino area causing problems during the construction of monitoring well MW08A/B. During the placement of the second annular seal, circulation of the drilling fluids was lost



Appendix A Figure 19
Access Box Detail
Newmark Operable Unit RI/FS Report